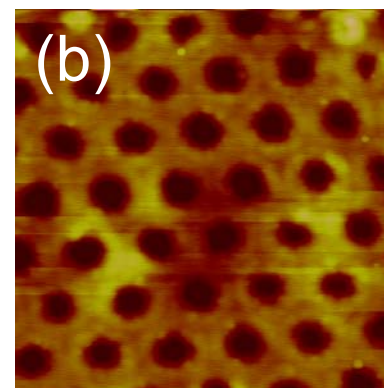
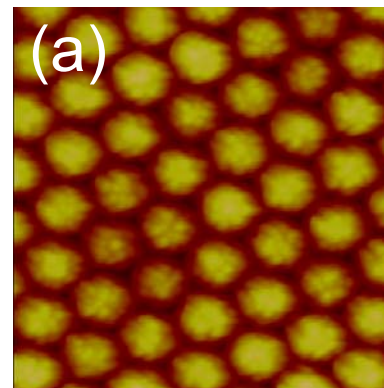


Film Morphologies of Styrene Copolymer Latexes

Warren T. Ford, Oklahoma State University, DMR-0102759

Monodisperse polymer latexes form a colloidal crystal (CC) on glass. From a CC of 300 nm spheres of a 90/10 styrene/2-hydroxyethyl methacrylate (HEMA) emulsion copolymer, absorption of vapor of styrene or toluene, followed by evaporation, transforms the CC to a nonporous interconnected colloidal array (ICA) that has the same periodicity as the CC on its upper surface and a periodic array of smaller particles in a matrix underneath. This unusual morphological change is attributed to the blocky character of the amphiphilic emulsion copolymer which segregates into regions of high PHEMA content and regions of nearly all polystyrene. Absorbed solvent plasticizes the polystyrene-rich regions of the film and allows the polymer to flow into a new kinetically trapped morphology. The results suggest a possible wealth of new morphologies of amphiphilic copolymers made by the simple method of emulsion polymerization.

Langmuir **2003**, 19, 7852; **2004**, 20, 3145.



AFM height images of PS/HEMA (a) a colloidal crystal and (b) an interconnected colloidal array.

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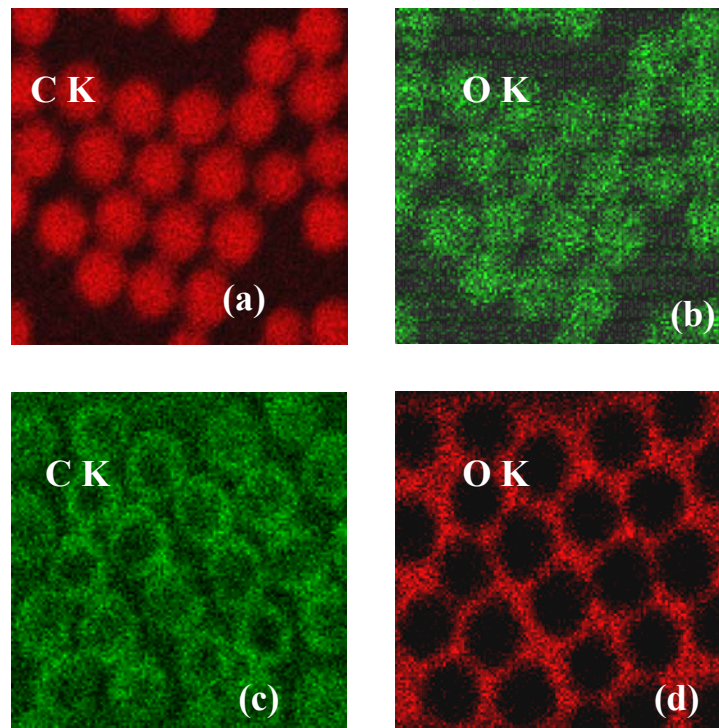
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Education

A group of seven graduate students is getting a broad education in chemistry, polymers and nanoscience from research, seminars, and formal classes. The PI contributed Spring 2004 to the university's first basic course in nanotechnology for 25 graduate and advanced undergraduate students from chemistry, physics, and engineering.

Broader Impact

The PI serves as project coordinator for the Oklahoma NanoNet, a diverse group of 50 faculty at Oklahoma universities. The NanoNet fosters interdisciplinary research collaborations, cooperates with industrial research labs, and holds an annual state conference. The NanoNet has attracted much attention of political and business leaders in the State.



EDS maps of K-edge X-ray emission from (a) carbon and (b) oxygen of a PS/PHEMA colloidal crystal, and (c) carbon and (d) oxygen of a PS/PHEMA interconnected colloidal array.